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# AGRICULTURAL NEWS LETTER

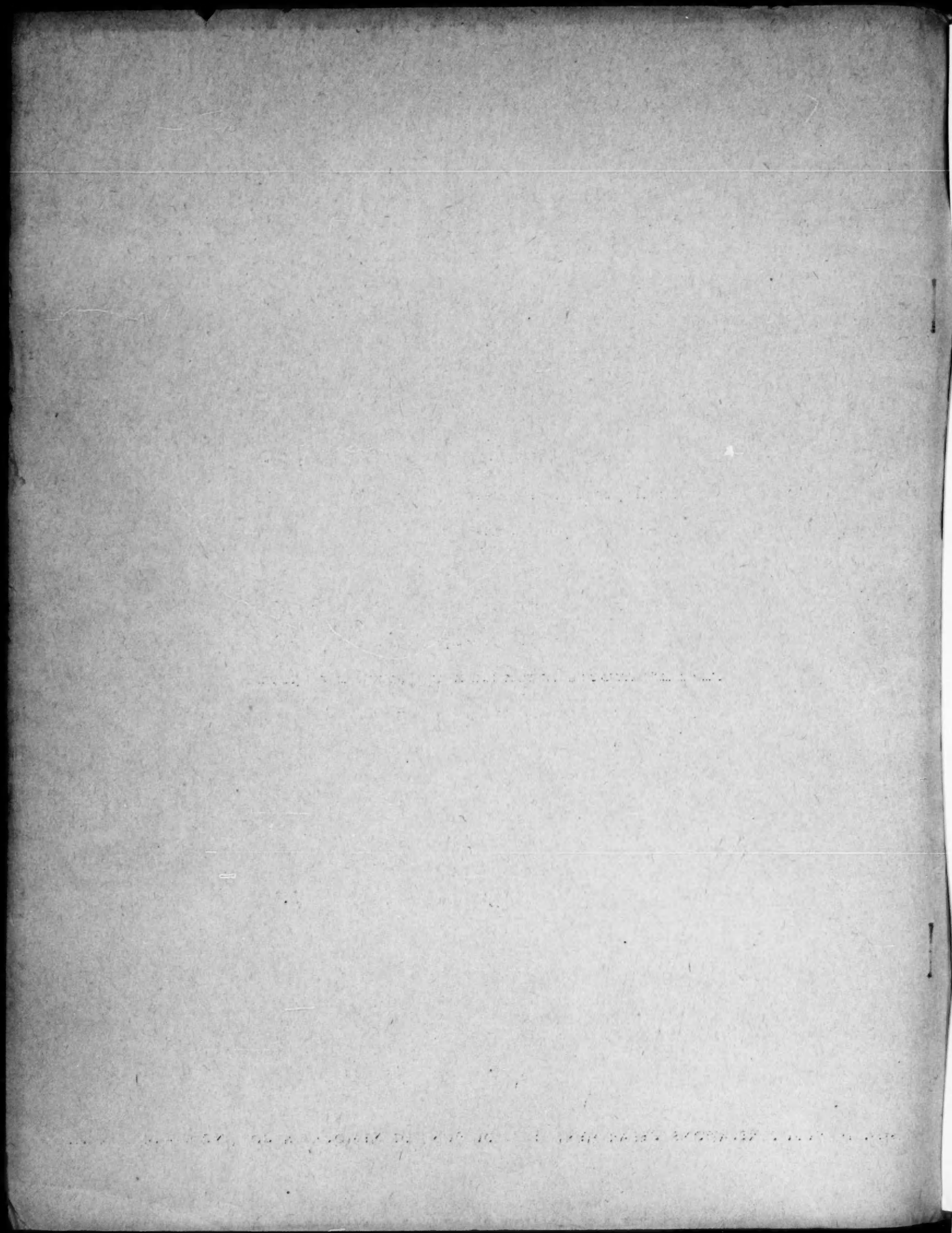
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This publication contains information regarding new developments of interest to agriculture based on laboratory and field investigations of the du Pont Company and its subsidiary companies. It also contains published reports and direct contributions of investigators of agricultural experiment stations and other institutions as related to the Company's products and other subjects of agricultural interest.



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AGRICULTURAL NEWS LETTER

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Agricultural Extension Division

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Dr. H. F. Dietz, Entomologist  
Pest Control Research Laboratory

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"ARASAN" -- NEW NON-METALLIC SEED DISINFECTANT AND PROTECTANT

Growers need not lie awake nights this winter worrying about getting enough chemical dusts to disinfect their farm and garden-crop seeds.

Large quantities of the old-established materials, such as "Semesan," "New Improved Ceresan," and "2% Ceresan" seed disinfectants, are in prospect, and in addition the new, inexpensive non-metallic organic sulfur compound -- tetramethyl thiuramdisulfide -- is being produced in commercial quantities for treating peanut, vegetable, and certain other seeds.

A limited amount of this material was first offered for general use in 1943 under the trade-mark "Arasan" by the Du Pont Semesan Company, whose research chemists and plant pathologists carried out the development work over a period of years.

Experimental and field results in 1942 and 1943 show that "Arasan" effectively increases stands of peanuts by the control of seed decay. Its value as a protectant of vegetables against both pre-emergence and post-emergence damping-off and other seed-borne and soil-borne diseases has been demonstrated by repeated trials with such seed as beets, cabbage, cauliflower, lima beans, sweet corn, tomatoes, chard, eggplant, peppers, salsify, and onions. Other tests indicate a still wider range of possibilities as a disinfectant and protectant for corn, soybeans, cowpeas, velvet beans, grasses, sorghum, and certain other field crops.

Chief Immediate Use Expected To Be On Peanuts and Vegetables

The principal immediate use of much of the available "Arasan" will probably be for peanuts, for which it was specifically developed, and for vegetables. The first three letters of the name are derived from Arachis hypogaea, the botanical name for the peanut.

Professor S. A. Wingard, Plant Pathologist, Virginia Agricultural Experiment Station, Blacksburg, in discussing various ways to increase peanut yields, recommends first, seed treatment before planting to prevent seed rot and, later, sulfur dusting of the growing plants in the field to control leaf-spot and leaf-hopper. He points out that seed treatment, at a cost of 15 to 20 cents for material to disinfect 100 pounds of peanut seed, usually gives a considerable increase in the stand of plants and of yield.

The Virginia scientist, in his Bulletin "Food for Victory," adds that "Arasan" seems "to be one of the safest and most efficient chemicals to use on peanut seed." He quotes experimental data showing that "Arasan" gave excellent results in Georgia, North Carolina, and Virginia. In these tests, conducted by Du Pont-Semesan research staff on 49 different farms, the stands from treated seed averaged 36 per cent better than did stands from the untreated seed. Professor Wingard, in his bulletin, adds:

Continued on next page

"It is felt that Virginia growers should use this material in preference to others." He says that "2% Ceresan" seed disinfectant, another Du Pont Semesan material, which has been tried for a longer time than the newer "Arasan," is highly effective also, but he cautions that overdosage and dry soil conditions must be avoided if "2% Ceresan" is used.

A U. S. Department of Agriculture statement, emphasizing that poor germination of peanut seed results in uneven stands, says a survey of one county in Georgia revealed that more than 200 farmers had less than half a stand from their plantings of untreated seed. This necessitated plowing up and replanting. It adds that experimental evidence is consistent and convincing as to the need for and value of seed treatment, particularly of machine-shelled seed. Shelling by machine apparently results in mechanical injury to the seed coat which makes the seed unusually susceptible to organisms that cause seed-rot.

#### Cornell Includes "Arasan" In Its Vegetable Seed Treatment Chart

The Department of Plant Pathology at Cornell University, Ithaca, includes "Arasan" in its new Vegetable Seed Treatment Chart for a number of crops. For instance, the chart recommends "Arasan" for control of damping-off and seed-rot of Lima and snap beans, beets, Swiss chard, eggplant, peppers, salsify, tomatoes, and spinach; and for control of onion smut.

#### Pathologist Suggests Further Testing for Vegetables in Different Areas

The Cornell recommendations are based on experiments conducted under the supervision of the agricultural experiment stations at Ithaca and Geneva, New York. Dr. George L. McNew of the Geneva staff recently reported results of numerous experiments with vegetables, and said that, because of the excellent results already obtained, "Arasan" is a "new and promising fungicide," and should be tested for different localities.

For instance, Dr. McNew indicates the value of "Arasan" in increasing the yield of sweet corn by reporting results of tests conducted on five successive planting dates from May 18 to June 19, 1942. He says the leading material in the tests for the season was "Arasan," applied at the rate of 1½ ounces per bushel of seed, which gave an average increase of 20 per cent in yield. He adds:

"This record was obtained by being consistently effective, even though it was excelled early in the season by the copper compounds and later in the season by the mercury treatments."

Dr. McNew makes it clear that, although these tests were made with exceptionally good seed, treatment with the various chemicals was consistently beneficial. "Semesan Jr.," for instance, gave 17.6 per cent increase, with the other materials used increasing the yield 16.5, 13.7, 12.9, 12.3, 11.7, and 8.9 per cent, respectively.

"There seems to be no justification for omitting treatments, because a couple of cents per acre invested in chemicals will increase the yield by

Continued on next page

several hundred pounds," he said. He added that "Arasan" should be more widely tested, and that one of the well-established treatments, such as "Semesan Jr.," used at 1½ ounces per bushel, can be depended upon to give good results.

#### Effective Against Stinking Smut of Wheat and Kernel Smut of Sorghum

W. Crosier, also the Geneva Station, advises that "Arasan" was effective against stinking smut of wheat, but that in his experiments it did not control oats or barley smuts. "Oats smut control still requires 'New Improved Ceresan' and to a greater extent than previously," he adds.

R. W. Leukel, United States Department of Agriculture, reports that in replicated tests with sorghum seed at seven experiment stations, "Arasan" was one of the materials that "improved emergence and controlled kernel smut in Sharon kafir. Smut in untreated plots ranged from 7.8 to 43.4%.

#### Same Chemical Compound Controls Brown Patch and Dollar Spot

The Du Pont Semesan Company also has made available commercial quantities of another non-mercurial turf fungicide containing tetramethyl thiuramdisulfide -- trade-marked "Thiosan" -- for control of brown patch and dollar spot diseases of the various bent grasses generally used for golf courses. This product has the same general characteristics as "Arasan," but disperses readily in water for easy spray application.

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#### DU PONT SCIENTIST STRESSES NECESSITY FOR COORDINATION OF RESEARCH

"Pest control depends on many fields of science for efficient operation," Dr. Harry F. Dietz, Entomologist, Du Pont Pest Control Research Laboratory, told the Central States Horticultural Conference and Joint Meetings of the American Pomological Society in St. Louis recently.

"Botanical and zoological sciences play a major part in the understanding of host and parasite and their relationships," he said. "Chemistry supplies some of the most effective products used. The engineering sciences are drawn on heavily for equipment used in the application of chemicals and other mechanical means of control. Physics is likewise involved in the consideration of the adhesivity and retention of sprays and dusts to treated surfaces and the effect of particle size of products on performance.

"In brief, all sciences that affect agriculture are involved. It is necessary that research in these various sciences be coordinated to attain maximum progress in pest control."

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### RATE OF PLANT-FOOD ABSORPTION BY COTTON

Absorption of nutrients and growth of cotton plants do not occur rapidly until time of boll formation, being very slow during the seedling stage and increasing somewhat -- but still slowly -- from seedling to early square.

Since more commercial plant food is applied to cotton in this country than to any other crop, these results obtained by the Georgia Experiment Station, Experiment, Ga., dealing with the amounts of plant food absorbed and the rate of uptake of the nutrients are of considerable importance. This work, conducted in 1939 and 1940, was recently reported by L. C. Olson and R. P. Bledsoe in Georgia Experiment Station Bulletin 222.

#### Three Soils Used

Cotton was grown on Cecil sandy loam, Tifton sandy loam, and Clarksville gravelly loam, representative soils of the Piedmont, Coastal Plain and Limestone Valleys. Plant food equivalent to 600 pounds of 6-6-6 fertilizer per acre was applied on Cecil; and to 600 pounds of 6-8-6 on Tifton and Clarksville types.

Samples of the above-ground portion of the plants were taken at four stages of growth: seedling, 30 to 60 days after planting; square, 75 to 90 days; boll, 110 to 130 days; and mature, 130 to 150 days after planting. At seedling stage, 100 or more plants were collected for each sample; while only 5 to 10 of more mature plants were taken. Samples were dried to constant weight at a temperature of 50 to 55°C., ground, and analyzed for nitrogen, phosphorus, potassium, calcium, and magnesium.

#### Dry Matter Production

The amount of dry matter produced on the three soils varied considerably. On the Cecil soil, approximately 9,700 pounds of dry matter per acre were produced; while on the Tifton and Clarksville soils, 6,100 and 5,000 pounds per acre, respectively, were grown. More than 90% of the total weight was produced in the latter half of the growing period on all soils.

#### Nutrients in Cotton Plants

The cotton that produced the largest amount of dry matter per acre also contained the largest quantity of plant nutrients (Fig. 1). The total amounts of the five nutrients absorbed were 538, 393, and 311 pounds per acre on the Cecil, Tifton, and Clarksville soils, respectively.

"The sum of the nitrogen, phosphoric acid, and potash was 315, 225, and 136 pounds, respectively, for these three soils," the bulletin says. "The fertilizer applied contained a total of 108 to 120 pounds of these constituents, which amounts represent only a part of that taken up." More than 80% of the plant nutrients taken up was absorbed in the latter half of the growing period.

Continued on next page



### A More Detailed Study

On the Cecil sandy loam, samples of cotton plants were also taken at 15-day intervals. These results, showing the very slow rate of early growth and plant-food absorption, are reported in detail in Table 1 and Figures 2 and 3.

Only 1% of the total plant food finally absorbed was taken up, and less than 1% of the total dry matter was produced, during the first 30 days after planting. Only 10% of the total dry matter was produced, and 14% of the plant food was absorbed, during the 60 days following planting, which represented two-fifths of the entire growing period.

After 90 days following planting, absorption of plant food and production of dry matter were very rapid. Cotton plants produced 69% of the total dry matter and absorbed 61% of the total plant food during the 30-day period from 90 to 120 days after planting.

Much of the new growth and absorbed plant food was found in the bolls. The major portions of the total nitrogen, phosphorus, and magnesium were in the squares and bolls with 78% of the phosphorus in the fruiting parts of the plant. Most of the calcium and potassium was in the stems and leaves.

### Summary

Absorption of nutrients and production of dry matter was very slow during seedling stage. During the seedling-to-early-square period, rates of absorption of plant food and of growth were increased, but were still slow. Very rapid absorption and growth occurred at time of boll formation. On the Cecil sandy loam the most active period was the 30-day interval beginning 90 days after planting.

"The amount of nutrients found in the cotton plant was greater than the amount ordinarily added in fertilizer mixtures, indicating the important part plant residues may play in maintaining the fertility of soils devoted to cotton production," the bulletin says. "Approximations for the average amount of nutrients found in the mature plants, per acre, for all three soils are as follows: nitrogen, 104 pounds;  $P_2O_5$ , 38 pounds;  $K_2O$ , 97 pounds;  $CaO$ , 132 pounds; and  $MgO$ , 43 pounds. It is interesting to note that nitrogen, potash, and calcium are found in quantities almost three times as great as the amounts in which phosphorus and magnesium are found."

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NOTE: A booklet, "The Rate of Plant Food Absorption and Its Relation to Fertilizers and Fertilizer Practice," which discusses tomatoes, tobacco, potatoes, and corn; and a reprint of the foregoing article on cotton will be sent upon request to the Editor, Du Pont "Agricultural News Letter," Wilmington 98, Delaware.

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TABLE 1  
 DRY WEIGHT PRODUCED AND NUTRIENTS ABSORBED BY COTTON PLANTS DURING  
 FIRST 30 DAYS AND EACH SUCCESSIVE 15-DAY PERIOD OF GROWTH  
 (Cecil Sandy Loam, Average, 1939 & 1940)

Days after plant- ing	Part Analyzed	Dry Wt. per Acre	Plant Nutrients Absorbed Per Acre					
			N	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	CaO	MgO	Total
		lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
30	Plants	15.20	.55	.10	.40	.86	.37	2.28
45	Plants	29.50	1.31	.29	.79	.68	.58	3.65
60	Plants	259.28	8.39	1.63	5.42	7.08	4.04	26.56
75	Plants	457.69	12.56	2.84	10.40	10.44	3.85	40.09
75	Squares and Bolls	38.72	1.33	.25	.77	.86	.44	3.65
75	Total	496.41	13.89	3.09	11.17	11.30	4.29	43.74
90	Plants	191.60	2.97	.95	16.41	1.58	-1.90	20.01
90	Squares and Bolls	89.57	2.95	.75	2.18	1.94	1.00	8.82
90	Total	281.17	5.92	1.70	18.59	3.52	-.90	28.83
105	Plants	2603.20	42.57	10.96	34.18	51.67	26.79	166.17
105	Squares and Bolls	1055.79	12.97	12.00	12.03	6.23	5.48	48.71
105	Total	3658.99	55.54	22.96	46.21	57.90	32.27	214.88
120	Plants	472.20	7.11	-2.74	--	26.54	6.27	37.18
120	Squares and Bolls	2603.56	29.98	17.10	18.09	13.95	12.61	91.73
120	Total	3075.76	37.09	14.36	18.09	40.49	18.88	128.91
135	Plants	-409.86	-16.28	1.49	3.52	11.47	-5.67	-5.47
135	Squares and Bolls	2807.01	26.35	19.14	23.31	12.75	13.96	95.51
135	Total	2397.15	10.07	20.63	26.83	24.22	8.29	90.04
150	Plants	-288.51	-1.87	-2.58	-6.00	-2.60	-5.69	-18.74
150	Squares and Bolls	-204.44	3.39	1.32	1.74	18.57	1.04	17.86
150	Total	-492.95	1.52	-3.90	-7.74	15.97	-6.73	-.88
Total	Plants	3330.30	57.31	12.94	65.12	107.72	28.64	271.73
Total	Squares and Bolls	6390.21	76.97	47.92	54.64	54.30	32.45	266.28
Total		9720.51	134.28	60.86	119.76	162.02	61.09	538.01

Figure 1—Nutrients in Mature Plants on Three Soils

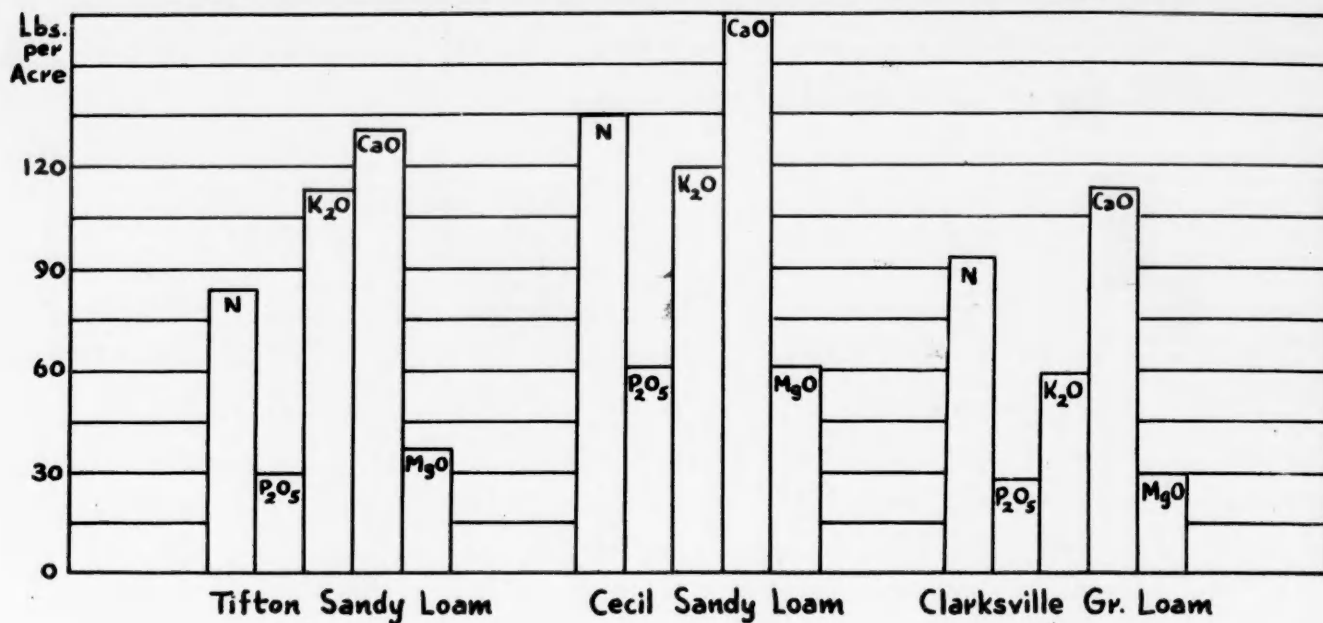
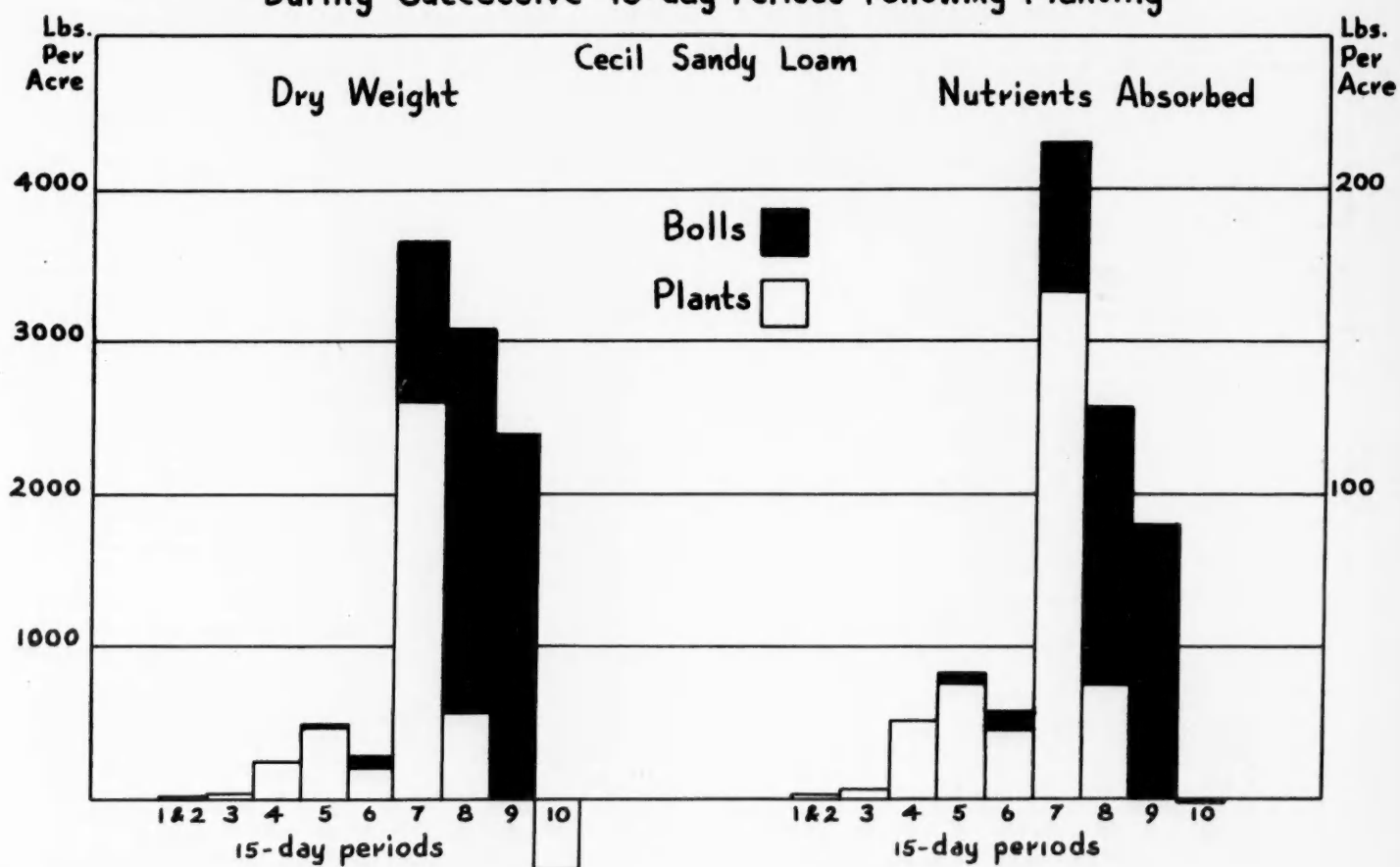


Figure 2—Dry Weight Produced and Nutrients Absorbed by Cotton Plants During Successive 15-day Periods Following Planting



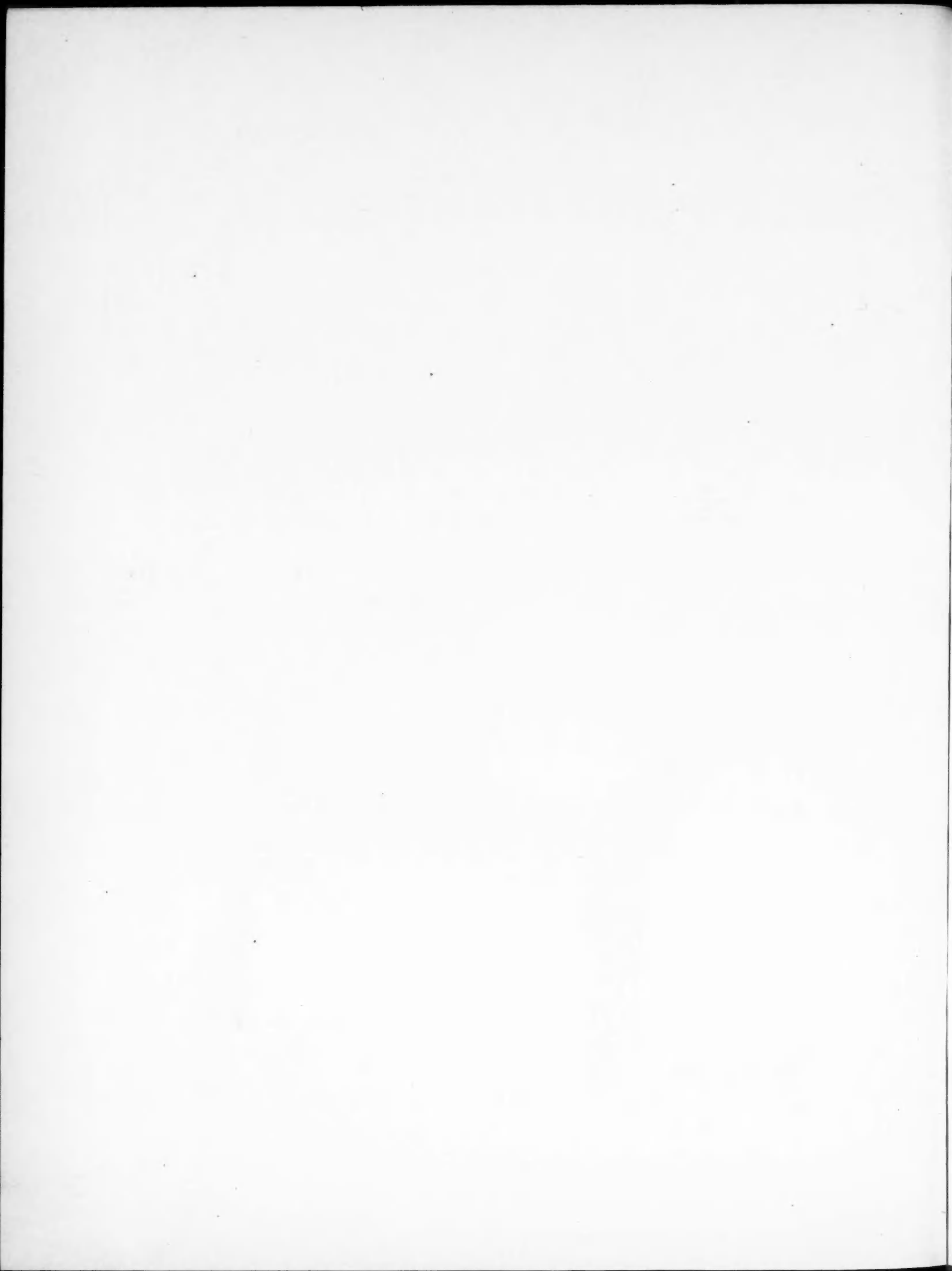
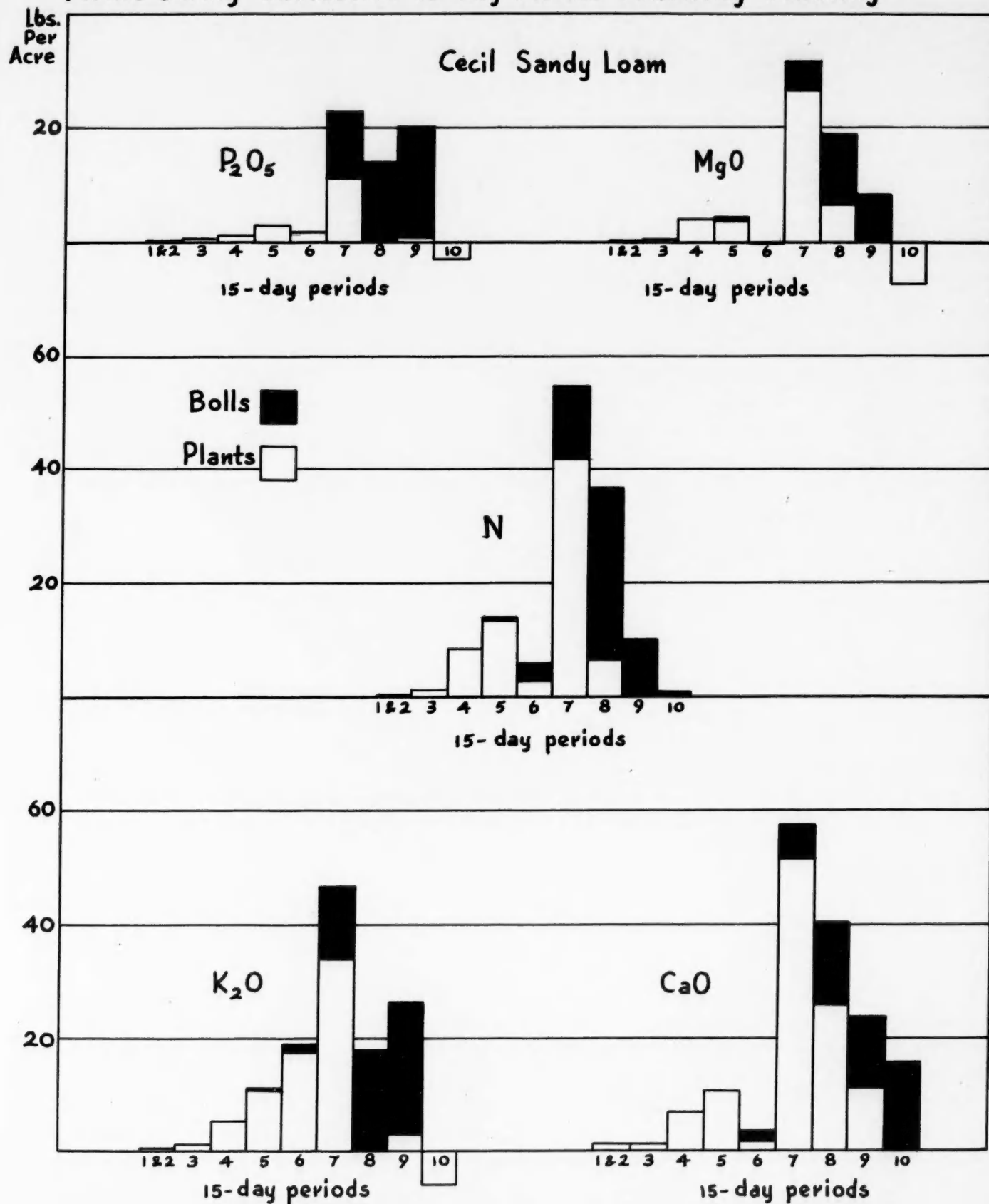
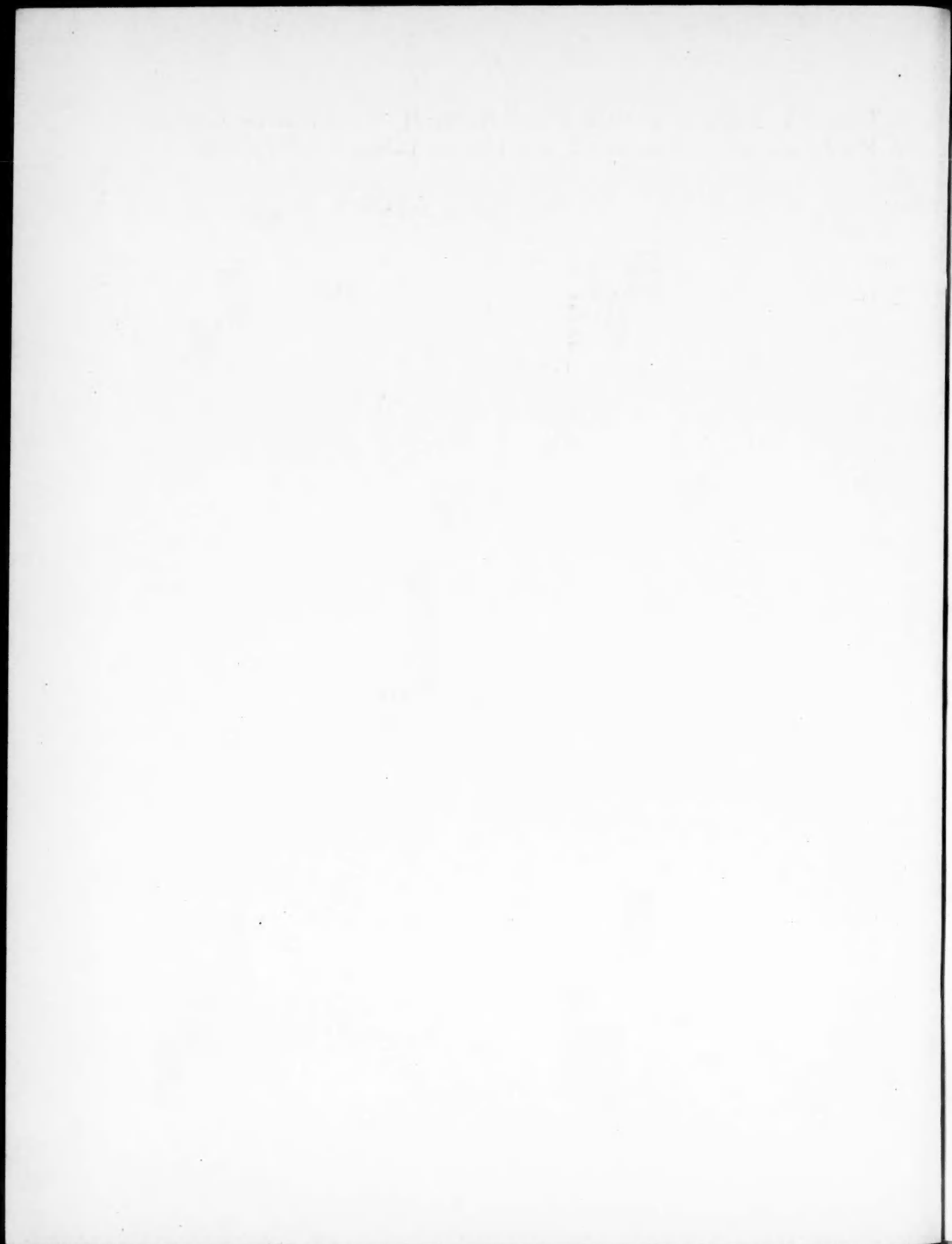




Figure 3- Amount of Each Plant Nutrient Absorbed by Cotton Plants During Successive 15-Day Periods Following Planting —





DU PONT ISSUES BOOKLET ON "MODERN METHODS OF EGG AND POULTRY MARKETING"

Anticipating that peace will bring to a greatly expanded poultry industry the urgent need for careful, skillful marketing of its products, the Du Pont Company has prepared for free distribution a comprehensive new booklet entitled "Modern Methods of Egg and Poultry Marketing."

The booklet, pointing out that the principles of good marketing never change, describes the marketing machinery and the principles on which it operates. It outlines some of the major operations involved in getting high-quality poultry and poultry products to the consumer quickly and cheaply.

The foreword says that to the poultry industry, now in the midst of a great war-production job, the question of better marketing methods may seem a somewhat dim secondary consideration. It adds, however, that when the war ends, marketing will be more significant than ever before. It continues:

"Under wartime pressures the whole industry is undergoing many revolutionary changes and developments, such as dehydration of eggs, quick freezing of poultry meat, improved poultry nutrition, better disease control, new markets, and new lines of distribution.

"Good marketing starts on the farm. The poultry producer who plans now for more efficient marketing of his products will be in the strongest position to meet the many impacts of post-war changes in demand, supply, and distribution. And, although the many and astonishingly rapid shifts now taking place will affect the methods of marketing after the war, the basic machinery for getting eggs and poultry from farm to consumer will be much the same."

The booklet emphasizes the fact that it is up to the individual producer to keep abreast of the times, and to determine how he can use the excellent marketing machinery to best advantage. It adds that he will find that efficient production of high-quality products, wisely marketed, wins in the long run.

The final page of the publication says the science of poultry nutrition has been enriched by the development of the discovery of the principle of changing certain chemical substances into vitamin D by irradiation with ultra-violet light, which eventually led to the creation by Du Pont chemists of "Delsterol" "D"-activated animal sterol, a highly efficient vitamin D supplement for poultry feed. This product is made entirely from domestic raw materials and is, therefore, always available.

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Note: A copy of the Du Pont Organic Chemicals Department's 36-page illustrated booklet, "Modern Methods of Egg and Poultry Marketing," will be sent upon request to the Editor, Du Pont "Agricultural News Letter," Wilmington 98, Delaware.

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# BLACK RASPBERRIES RESPOND TO FERTILIZATION WITH CHEMICAL NITROGEN

Fertilizing young, vigorous, uniform Cumberland black raspberry plants with chemical nitrogen gave significantly higher yields of larger-sized fruit in experiments conducted by the Geneva, N. Y., Agricultural Experiment Station.

The three carriers of chemical nitrogen used in the tests -- "Uramon" fertilizer compound, nitrate of soda, and sulfate of ammonia -- were equally effective when used in quantities that supplied equal amounts of nitrogen.

Because 100 pounds of "Uramon" carries 42 pounds of nitrogen, only 115 pounds of that material were used per acre; while 300 pounds of nitrate of soda and 240 pounds of sulfate of ammonia were required per acre to equalize the nitrogen applications.

Soybean meal, an organic source of nitrogen, applied at the rate of 700 pounds per acre, gave a significant yield increase over no treatment, but was a poorer source of nitrogen than the other three.

Results are shown below:

TREATMENT (Pounds per Acre)	::AV. OF 4 PLOTS (Each Plot 1/125 Acre)		
	::	Quarts per Plot	: Canes per Plot
"Uramon" (115)	::	37.7	: 9.4
Sulfate of ammonia (240)	::	37.7	: 9.7
Nitrate of soda (300)	::	36.6	: 8.7
Nitrate of soda (300) plus sulfate of potash (200)	::	36.1	: 8.9
Nitrate of soda (300) plus 20% superphosphate (500) plus sulfate of potash (200)	::	36.4	: 9.3
Soybean meal (700)	::	32.1	: 8.9
No fertilizer (0)	::	25.0	: 7.4

The highest yield represents an acre production of about 4,700 quarts. Nitrogen at the rate applied increased the acre yield by more than 1,500 quarts which, at 12 cents, represents an increase of \$180 per acre at an expenditure of only \$4 to \$6 for fertilizer. In addition, berries on the fertilized soil were bigger than those produced on the untreated land.

## Potash and Phosphoric Acid In Fertilizer Gave No Significant Differences

R. C. Collison and G. L. Slate of the Geneva Station report that, while every one of the six treatments gave highly significant increases in yields over untreated areas, nitrogen was the effective factor, the presence in the fertilizer of phosphorus or potassium or both giving no significant differences.



"The yield of raspberries depends quite obviously not only on the amount of fruit per cane, but also on the number of fruiting canes," they add. "Here again, fertilizers had a significant effect on the number of canes to the plot or to the plant. In fact, all the treatments were significantly better than no treatment in this respect. There were, however, no significant differences among the treatments, even soybean meal being as effective as the other nitrogen carriers. Obviously, it was nitrogen again which was the factor in producing more canes. Although there was a consistent trend toward larger canes on plants receiving nitrogen, the differences were not significant."

Collison and Slate conclude: "From the practical standpoint the results of our experiments show a highly worthwhile return for money invested in nitrogen for black raspberries, even on what may be considered a quite productive soil. Verification of these results is being sought through continuation of the experiment."

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#### TO CONTROL RESPIRATORY POULTRY DISEASES

Formaldehyde fumigation of buildings in which respiratory poultry diseases, such as infectious bronchitis and laryngotracheitis, have existed is recommended by the Colorado Agricultural Experiment Station.

The Poultry Department of Colorado State College, basing its recommendation on experiments conducted at the Experiment Station, advocates dampening the room and equipment with water and, after closing the room airtight, raising the temperature to as near 100 degrees F. as possible. Tests have shown that wet newspaper may be tacked or packed over openings and cracks. The recommendations add:

"For every 1,000 cubic feet of air space, measure 1 pint of formaldehyde (40 per cent) into a 2-gallon crock. Place crocks evenly around room. By each crock, place a paper square on which one-half pound of crude potassium permanganate crystals has been measured. Turn out any burners in the room. Then, starting at the corner farthest from exit, dump permanganate into the crocks, proceeding rapidly. Immediately close the exit tight and leave the room overnight or several days before opening and airing."

The Colorado poultry experts caution that the building must, of course, be emptied of chickens before fumigation.

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### NEW CHEMICAL TREATMENTS ENDOW WOOD WITH UNUSUAL PROPERTIES

New chemical treatments that virtually endow wood with the properties of a plastic and give it added strength, wearing qualities, hardness, and resistance to warp and swell were described by Dr. J. F. T. Berliner of the Du Pont Ammonia Department in an address before the Eastern Lumber Salesmen's Association in Philadelphia recently.

Treatment by these new chemical methods develops such unusual properties that "actually we are no longer dealing with wood," he declared.

Describing the new treatment by which poplar, for example, can be made as hard or harder than hard maple and given dimension stability and other desirable properties, the speaker said:

"It has been found that when wood is impregnated with a resin solution such as a lacquer, the resin may fill the wood cells but the properties of the wood are not fundamentally altered. It will still shrink and swell with changes of humidity, and the grain will raise when a sanded face is exposed to moisture.

"However, if the wood is impregnated with resin-forming chemicals capable of reacting with the wood components, and the resin then produced within the wood, the properties of the wood are profoundly altered. When sufficiently treated, the wood is dimensionally stable under varying humidity conditions, does not show grain raising, is hardened, can be highly polished, has increased wearing qualities, and has markedly increased compressive strength as well as much higher strength in tension across the grain."

Soft maple thus treated may even be used to replace dogwood in textile shuttles, Dr. Berliner stated. The compressive strength of wood as well as its hardness can be so increased that treated wood may be substituted for steel in certain textile machinery parts where wood has hitherto been unusable.

### Postwar Possibilities of Dimensionally Stable Lumber

The speaker noted the postwar possibilities of dimensionally stable lumber to eliminate the sticking drawer, door or window, and of finishes formed in the wood so that beautiful woods like cypress could be used for purposes other than paneling, sidings, shingles and tanks.

An important development of the war period has been the production of large composite beams, arches, boards and the like from small, readily produced, easily dried sections by gluing, he said. Boards and sections in sizes unobtainable from natural sources are now in regular production.

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"You do not have to have a big tree to get big timbers, structural members, or boards," he stated. "Heretofore one had to seek long and far to obtain a 12 by 12 inch side-cut oak timber and then wait several years to condition it for use. Now, however, small sections of oak may be cut and fabricated into a 12 by 12 inch in a matter of a week or so."

#### Five Classifications Of Wood Treatments

The speaker enumerated five divisions into which wood treatments may be classified, as follows: (1) preservation, including flame, insect, rot, and chemical proofing; (2) reassembly, or making plywood, plastics, paper, paper-board and such products from wood; (3) chemical conversion of wood into rayon, cellophane, sugar and alcohol, explosives, distillation to form charcoal, methyl alcohol, acids, and conversion of lignin to adhesives, plastics and vanilla flavor; (4) drying or seasoning; and (5) altering mechanical properties such as hardening, increasing strength, bending and dimension control.

#### Chemist Challenged By Assumed Limitations Of Wood

These advances Dr. Berliner ascribed to the chemist's attitude toward wood as a raw material, the properties of which he considers may be altered as desired. The chemist is challenged by the assumed limitations of wood, such as slow drying; its tendencies toward splitting, checking and warping during drying; flammability; rotting; swelling and shrinking with humidity changes; that it does not grow fast enough, tall enough or thick enough.

By removing the handicaps of unalterable properties and dependence on logging certain size trees for certain dimensions, chemical science has gone far toward reestablishing the position of wood in competition with other materials.

Plastics and metals for years had been pushing wood from fields which it had possessed exclusively. This was because the other materials were fashioned to conditions demanded of them, even to the point of simulating wood in appearance.

Now wood has a new start. The lumber industry is contributing magnificently to the war program. The Army alone is using more than 800 separate items of wood. The uses for lumber in both war and in the peace to come are being extended by the united effort of the lumber and chemical industries.

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NOTE: The complete text of Dr. Berliner's address will be sent upon request to the Editor, Du Pont "Agricultural News Letter," Wilmington 98, Delaware.

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### ADVANTAGES OF PHENOTHIAZINE-SALT MIXTURE FOR SHEEP

By Prof. Robert F. Miller,  
Animal Husbandry Department,  
University of California,  
Davis, California.

One of the common ailments of sheep is an infestation of worms in the intestinal tract. Over a period of years a great many remedies have been prescribed. The two most commonly used are the cunic mixture (1 per cent solution of copper sulfate and nicotine sulfate) and the Nema capsule which is tetrachloroethylene. Lately a new drug known as phenothiazine has come into the field. It was first used at the California experiment station for intestinal worms in horses with excellent results. Later it was administered to sheep in several forms; as a powder given in gelatin capsules, as a water solution, and in form of pellets.

#### Feed with Salt

Considerable experimental work has been done at this station in Davis in testing the various forms of phenothiazine treatment with Dr. J. W. Britton of the veterinary science division and myself. We first conceived the idea of incorporating the phenothiazine powder with salt, allowing the sheep to take it at will in the form of a salt lick. With the help of a senior student, various combinations of ground salt, bone meal, gentian, ginger, tobacco and molasses were tested to determine which of the prepared mixtures were readily consumed by the sheep. Phenothiazine was then added at the rate of 1 part to 15 parts of the preferred salt mixture (salt 90 per cent, bone meal 5 per cent, molasses 5 per cent). One lot of five sheep was fed this mixture while another lot of five was given salt alone. Droppings were collected weekly and worm egg counts were made through regular microscopic procedure. It was noted that the sheep which received the phenothiazine in their salt passed very few worm eggs in the droppings while those receiving no phenothiazine showed a fairly high egg count. Also the sheep receiving phenothiazine in salt seemed to show a preference for the salt mixture.

#### Flock Tests

Following this lead Dr. Britton interested a lamb feeder who fattens from 5,000 to 10,000 lambs every year in the San Joaquin Valley, to test the phenothiazine-salt mixture with lambs on Ladino clover pasture. One lot was allowed the salt mixture (common salt and phenothiazine, 1 to 15) while the other lot had free access to salt alone. The results were quite favorable and this grower was so well pleased that he fed the salt and phenothiazine mixture to about 5,000 head for the entire feeding period. These lambs fattened quickly and there were practically no death losses.

Continued on next page



Two additional groups of ewes were tested by feeding the phenothiazine and salt mixture and observing the sheep as well as taking the egg counts, and again there was marked improvement after 30 to 40 days' treatment.

L. J. Sawyer, Oakdale, Stanislaus County, has just completed a very valuable test under the direction of Dr. Britton, with lambs on Ladino clover. Two hundred lambs were evenly divided, one group was fed the salt and phenothiazine mixture while the other was given straight salt. The lambs weighed 69 pounds each when placed on clover and at the close of 57 days feeding, the phenothiazine lot weighed an average of 106.7 pounds while the other lot weighed an average of 93.2 pounds. The latter did not show the thriftiness of the first lot.

Group one made a total gain per lamb of 37.7 pounds while Group II made a total gain per lamb of 24.6 pounds. Both groups were on equally good feed, in fact only a partition fence separated the two lots. At 15 cents per pound this represents an increased profit of \$1.96 per lamb due to the feeding of the phenothiazine-salt mixture.

At the close of the test all the lambs in Lot I were sold while about one-half of those in Lot II were not fat enough for market and these were then given the phenothiazine-salt mixture until they were finished. Mr. Sawyer is most enthusiastic about the use of phenothiazine-salt mixture for lambs on Ladino clover.

#### Additional Tests

At present Dr. Britton and I have a test under way at the Ed Owens ranch near Woodland with eight lots of lambs, administering eight different treatments including one control. Altho the lambs have only been on feed about 45 days the ones getting the salt and phenothiazine mixture appear to be in better condition and more thrifty than the others. Furthermore, droppings of all lots were collected on August 2 and the worm egg count was very high in the control lot, a medium number in the lots treated monthly with the commonly accepted drugs while there were no eggs present in the lot getting 1 part phenothiazine and 10 parts salt.

Drs. Thorp and Keith of the Pennsylvania State College have recently completed a very interesting test with phenothiazine and again the salt mixture proved very efficacious. They used a concentration of 1 part phenothiazine to 9 parts of salt.

Drs. Foster, Shorb and Habermann of the U. S. Department of Agriculture and Dr. Boughton of the Texas station have also lately investigated the use of phenothiazine as an anthelmintic with favorable results.

#### Advantages of Salt Feed

In our opinion this new method of treating for worms by allowing the lambs to consume a very small amount of phenothiazine daily in salt is a very great improvement over the old methods of treatment.

Continued on next page

It eliminates coralling the sheep the night before and individually handling and dosing each sheep.

It eliminates death losses due to improper drenching by inexperienced help.

It saves time and labor - two most important factors.

Lambs respond quickly to the treatment. This discovery will save thousands of dollars to the sheep industry of the state."

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NOTE: A reprint of the foregoing article by Professor Miller will be sent upon request to the Editor, Du Pont "Agricultural News Letter," Wilmington 98, Delaware.

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#### MAN-MADE WOUNDS AMONG CAUSES PREDISPOSING ANIMALS TO SCREWORM INFESTATION

Forty-three different kinds of wounds, ranging from man-made shear cuts to sores caused by prickly pears and cockleburs, predispose livestock to screwworm infestation, according to research by the U. S. Department of Agriculture.

In tests conducted in Texas in 1936, 1938, 1939, and 1940, information on the wound-producing factors was compiled incidental to the collection of data on the larvicidal and protective action of various chemicals used to protect wounds of animals from this destructive pest, which causes losses in wool and mohair, reduction in weight and even death of many animals.

More than 6,000 wounds were listed and studied, as follows: sheep 2,522, lambs 1,324, goats 1,345, kids 224, cattle 274, calves 402, horses 13, and hogs 44.

#### Smear 62, Containing Diphenylamine, Acts Quickly As Control

The most effective combination of chemicals for control of screwworm infestation is Formula No. 62, made according to specifications of the U. S. Bureau of Entomology and Plant Quarantine. This material, known also as Smear 62, contains diphenylamine, benzol, Turkey-red oil, and lampblack. Applied externally to cuts, wounds, and sores, it has been found to act quickly and effectively both as a protectant and as a killing agent.

Continued on next page

Of the 43 kinds of infested wounds discovered in the Texas tests, seven are man-made: branding, castrating, dehorning, docking, earmarking, registered tagging, and shear cuts. Shear cuts, the most frequently infested man-made wounds, were responsible for 48 per cent of the infestations in goats and 73 per cent in kids.

#### Eight Types of Wounds May Be Eliminated

Eight types of wounds may be eliminated, as follows: birth, breeding, cockleburrs, hog and dog bites, hooking, lice, prickly pears, and sore mouth. Wounds caused at birth are by far the most important, since they made possible about 63 per cent of the screwworm infestations in calves and 8 per cent in cattle.

In addition, boils, broken horns, horn flies, needlegrass, warts, and wire cuts cause wounds that may be in part eliminated. Of this group, the most outstanding is needle grass, which led to 35 per cent of the infestations in the lambs and 27 per cent in sheep. The principal cause of infestation in horses was wire cuts.

Wounds requiring the aid of research veterinarians are cancer brisket, cancer eye, lumpy jaw, and pink eye. The latter alone was responsible for 18 per cent of the screwworm attacks on lambs and 6 per cent on sheep.

#### Screwworm Flies That Might Infest Wounds Can Be Greatly Reduced

Types of wounds that cannot be extensively controlled are abnormal horn growth, beggar-lice seed, briars and thorns, broken bones, drain from wound, ear ticks, fighting, foot injuries, genitalia injuries, horse flies, wound licking, old sores, scours, snags, snake bites, stone bruises, udder infection, and wet wool. Of these, fighting, udder infection, and ear ticks are the most important, as shown in the table on page 16 supplied by Henry E. Parish, Bureau of Entomology and Plant Quarantine. Fighting, too, was the chief cause of infestations among hogs. While these types of wounds cannot be largely eliminated, the screwworm flies that might infest them can be greatly reduced in number, Mr. Parish says.

As indicated in the table, many types of wounds can be prevented and danger from screwworm infestation largely eliminated. Shear-cut infestations in sheep, for instance, can be greatly reduced by shearing before screwworms appear and by applying Smear 62 to wounds that do appear.

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**NUMBER OF SCREWORM INFESTATIONS FOUND IN DIFFERENT TYPES OF WOUNDS**

Wound	Sheep	Lambs	Goats	Kids	Cattle	Calves	Total
<u>Made by man:</u>	:	:	:	:	:	:	:
Branding	--	--	--	7	12	2	21
Castrating	--	16	3	12	--	42	74
Dehorning	3	--	--	--	--	6	9
Docking	--	69	--	--	--	--	69
Earmarking	--	--	--	--	--	--	1
Registered tagging	3	1	1	--	--	--	5
Shear cuts	124	16	647	165	--	--	952
<u>That may be eliminated:</u>	:	:	:	:	:	:	:
Birth	6	14	15	5	23	256	326
Breeding	111	13	15	--	1	--	140
Cockleburs	7	--	--	--	--	--	7
Hog and dog bites	9	2	2	1	--	--	17
Hooking	2	--	--	--	2	--	4
Lice	--	--	1	--	--	--	1
Prickly pears	86	25	22	--	1	1	135
Sore mouth	36	127	1	--	--	--	164
<u>That may be in part eliminated:</u>	:	:	:	:	:	:	:
Boils	98	21	286	11	7	17	440
Broken horns	16	10	63	4	3	--	96
Horn flies	51	24	7	--	88	24	194
Needlegrass	700	476	1	1	--	--	1178
Warts	3	--	96	1	28	13	141
Wire cuts	3	--	4	--	21	6	41
<u>Requiring aid of veterinarians:</u>	:	:	:	:	:	:	:
Cancer brisket	17	6	29	--	--	--	52
Cancer eye	--	--	--	--	17	--	17
Lumpy jaw	5	--	--	--	4	--	9
Pink eye	168	242	3	--	2	--	415
<u>That can't be extensively controlled:</u>	:	:	:	:	:	:	:
Abnormal horn growth	6	--	2	--	--	--	8
Beggar-lice seed	--	1	--	--	--	--	1
Briers and thorns	10	7	4	1	--	--	22
Broken bones	--	--	6	--	--	1	7
Drain from wound	5	1	2	--	5	1	14
Ear ticks	97	102	11	2	9	4	225
Fighting	587	--	1	--	4	4	36
Foot injuries	11	10	9	1	1	4	36
Genitalia injuries	24	1	1	1	1	1	33
Horse flies	--	--	--	--	12	3	15
Wound licking	7	7	11	2	--	1	28
Old sores	2	--	4	--	--	--	6
Scours	22	19	1	--	--	--	42
Snags	31	9	27	2	4	3	81
Snake bite	2	1	3	--	1	--	4
Stone bruises	1	--	--	--	2	--	4
Udder infections	118	--	17	--	2	--	137
Wet wool	6	14	--	--	--	--	20
Unknown	145	90	50	8	24	17	336
<b>Total</b>	<b>2522</b>	<b>1324</b>	<b>1345</b>	<b>224</b>	<b>274</b>	<b>402</b>	<b>6148</b>



